

Space Weather Technical Forecast

Issued on Wednesday, 27 October 2021 at 01:22 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Increased daily Chance of M-class flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate in the 24-hour period, with two M-class flares, peaking at M1.3 at 26/0247 UTC. Both flares emanated from a new region lying on the northeastern limb, this has been numbered AR2891, provisionally analysed Alpha/ Hsx. This region is likely to have been the source for several far-sided Coronal Mass Ejections (CMEs) and associated flares in the past week, as observed on coronagraph imagery. This new region is one of six on the current disc, with these otherwise all appearing in the southern solar hemisphere. The most noteworthy of these regions remains AR2887, which appears as a Dki Beta-Gamma, although it continues to deliver smaller flares than expected for its class. AR2888 has almost completely faded.

While there are numerous filaments on the disc and there continue to be several eastward-heading CMEs from the possible limb region(s), there is no evidence of Earth-bound CMEs in available coronagraph imagery at present.

Solar Wind / Geomagnetic Activity: The solar wind, as measured by DSCOVR at L1, remained at background levels below 390 km/s. The density was mostly average at 10 ppcc or below. The IMF was weak below 7 nT and a north-south component ranging between +4 and -5nT. The phi angle was variable but predominantly within a negative sector (towards the sun). The result of the above solar wind measures was Quiet geomagnetic activity throughout, Kp 0-2.

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) as measured by GOES-16 was at Background levels, with no solar radiation storms observed. High energy electron flux (greater than 2 MeV) was predominantly at Normal Background levels. Associated 24-hour electron fluence was well below the Active (1e8 integrated pfu) threshold, with 1.51e6 integrated pfu recorded at 26/2359 UTC.

Four-Day Space Weather Forecast Summary

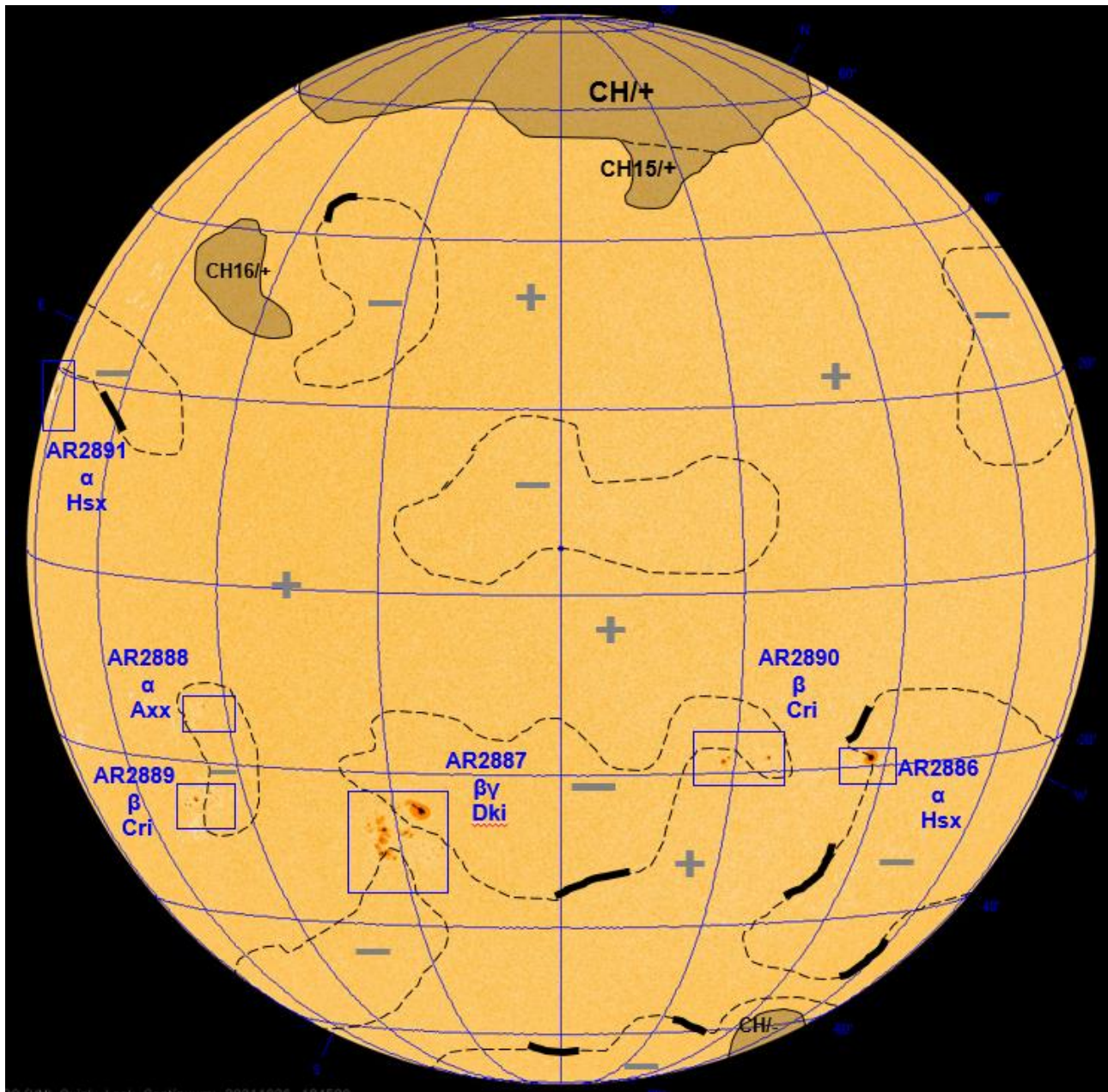
Solar Activity: There is an increased daily Chance of M-class flares, the result of the complexity of AR2887, and new region AR2891 lying on the northeastern limb. C-class flares are Expected.

Solar Wind / Geomagnetic Activity: No Earth-directed CMEs feature in this forecast period. Slight enhancements are possible due to the southern extension of the northern crown, CH15/+, though this is considered unlikely, especially given there was no measurable response at STEREO, which is further north relative to Earth on the ecliptic plane. The chances of G1 are correspondingly reduced to a flat 1% throughout.

Energetic Particles / Solar Radiation: The high energy (greater than 10 MeV) proton flux is expected to remain at Background levels, with no solar radiation storms currently expected. The high energy electron flux (greater than 2MeV) is likely to remain at Normal Background levels, with the 24-hour fluence expected to remain well below Active.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

Figure 1. Solar Analysis Valid 26/1900 UTC.



Key: Filament — , Prominence — , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α - β - γ - δ and Zurich-McIntosh Axx etc.

Geomagnetic Storms:

No Earth-directed CMEs feature in the current four-day forecast. There are several filaments on the visible disk, but these appear stable at the moment.

The only coronal hole in the forecast is the southern extension of the northern crown, denoted CH15/+. This more closely matches the previous rotation's appearance in recent days, however it has still yet to manifest at STEREO A, which lowers confidence in it becoming geoeffective.

This is especially true as STEREO A is orbiting at a slightly higher solar latitude at present (7N versus 5N for Earth) and ought to be (slightly) more directly in line for effects. It may be that recent solar wind density increases here are related to skirting this coronal hole's influence, however the solar wind speed remains at nominal levels.

Geomagnetic activity is expected to be Quiet, with a chance of isolated Unsettled intervals and a slight chance of Active should we observe any faster solar winds.

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	1	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Geomagnetic Activity - Earthbound Coronal Mass Ejections - Nil**Radio Blackouts - X-Ray Flares:**

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The X-ray forecast and the risk of Radio Blackouts remain the most notable element of space weather at present. The sun is becoming very polarised and distinct in HMIBC imagery, with strong regions of opposing polarity, certainly compared with recent days.

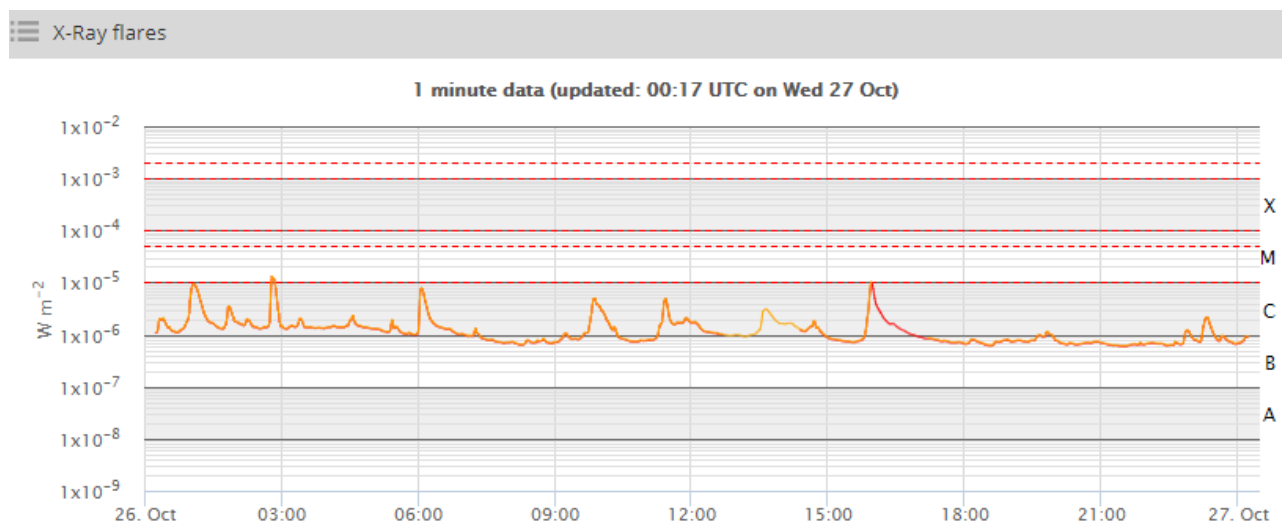
The solar disc has become increasingly congested, particularly in the southern solar hemisphere, which has a near-continuous train east-to-west of sunspot regions in various states of development. The most nominally threatening of these regions remains AR2887, however despite appearances this sunspot group has so far failed to produce noteworthy activity.

The northern solar hemisphere had been quieter until the arrival of a new sunspot region, AR2891, lying on the northeastern limb, this region was the source of two M-class flares on the 26th and potentially the source of some recent far-sided CMEs and flares. The Penticton 10.7cm flux rose to match recent peaks (roughly a month apart) in excess of 100 sfu.

With the arrival of AR2891 the chances of further M-class flares has been revised upwards to a daily 40% Chance, while C has increased to 90%.

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X Class	No	2	2	2	2

Figure 2: GOES16 X-Ray flares shows two low M-class flares through the 26th Oct.



Solar Radiation Storms - (High Energy Protons):

Although there are currently no significant sunspots in geoeffective positions on the Sun, if the AR2891, currently on the northeastern limb region, remains an active force as it progressively rotates towards the meridian later this week, the risk of S1 may rise. No solar radiation storms are currently expected, but this is under review.

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)

High Energy Electrons Event (≥ 2MeV):

The high energy (greater than 2 MeV) electron flux is currently at Normal Background levels, and may remain so throughout the forecast period. There are no CMEs in the forecast at present. With significant enhancements in the solar wind considered unlikely fluence is not expected to breach Active threshold throughout.

GEO Electron Environment	Level (cm ⁻² sr ⁻¹ day ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ 2 MeV ≥ 1x10 ⁸	No	1	1	1	1
Very Active	≥ 2 MeV ≥ 1x10 ⁹	No	1	1	1	1

Figure 3: MOSWOC Relativistic Electron Fluence Model observed and forecast well below 1e8 integrated pfu Active level.

